CLAIMS

1. A sensor comprising a microfluidic channel and an electronic sensing device on a first substrate, and a second substrate bonded to the first substrate so as to close the microfluidic channel, wherein a functional part of the electronic sensing device is exposed at the surface of the microfluidic channel.

2. A sensor according to claim 1 wherein the exposed functional part of the electronic sensing device is organic.

3. A sensor according to claim 2 wherein the exposed functional part of the electronic sensing device is a polymer.

4. A sensor according to any preceding claim wherein the microfluidic channel is formed by embossing.

5. A sensor according to any preceding claim wherein the exposed functional part of the electronic sensing device is insoluble in water.

6. A sensor according to any preceding claim wherein the functional part is a part on whose properties the electrical characteristics of the device are dependent.

7. A sensor according to any preceding claim wherein an electrical property of the exposed functional part of the electronic sensing device is sensitive to environmental conditions within the channel.

8. A sensor according to claim 7 wherein the environmental conditions are temperature.

9. A sensor according to claim 7 wherein the environmental conditions are the presence of a species to be sensed.

10. A sensor according to any preceding claim wherein the electronic sensing device is a transistor.

11. A sensor according any preceding claim wherein the exposed functional part of the electronic sensing device is an insulating layer.

12. A sensor according to claim 11 as dependent on claim 10 wherein the exposed functional part of the electronic sensing device is a gate dielectric layer of the transistor.

13. A sensor according to any of claims 1 to 10 wherein the exposed functional part of the electronic sensing device is a conducting layer.

14. A sensor according to claim 13 as dependent on claim 10 wherein the exposed functional part of the electronic sensing device is a gate electrode of the transistor.

15. A sensor according to any of claims 1 to 10 wherein the exposed functional part of the electronic sensing device is a semiconducting layer.

16. A sensor according to claim 15 as dependent on claim 10 wherein the exposed functional part of the electronic sensing device is an active semiconducting layer of the transistor.

17. A sensor according to any preceding claim wherein the height of the channel is 1mm or less.

18. A sensor according to any preceding claim wherein the height of the channel is 20μm or less.

19. A sensor according to any preceding claim wherein the width of the channel is 1mm or less.

20. A sensor according to any preceding claim wherein the width of the channel is 20μm or less.

21. A sensor as claimed in any of claims 10 to 20 as dependent on claim 10, wherein the transistor is a vertical-channel field-effect transistor.

22. A sensor comprising a first organic substrate having a microfluidic channel and an electronic sensing device located therein, and a second substrate bonded to the first substrate so as to close the microfluidic channel.

23. A sensor according to claim 22 wherein the second substrate is an elastomer.

24. A sensor according to claim 22 or claim 23 wherein a further microfluidic channel is located in the second substrate.

25. A sensor according to any of claims 22 to 24 wherein a conducting part of the electronic sensing device is exposed at the surface of the microfluidic channel.

26. A sensor according to claim 25 wherein the conducting part is organic.

27. A sensor according to claim 26 wherein the conducting part is PEDOT/PSS.

28. A sensor according to claim 27 for sensing the presence of glucose in the microfluidic channel.

29. A sensor according to any of claims 22 to 28 for detecting the pH level of a substance in the microfluidic channel.

30. A sensor comprising a microfluidic channel and a pair of electrodes of an electronic sensing device, wherein the microfluidic channel and the pair of electrodes are defined in a single operation.

31. A sensor as claimed in claim 30 wherein the said operation is embossing.

32. A sensor according to claim 30 or 31 wherein the microfluidic channel is located in an organic substrate.

33. A sensor according to claim 30 to 32 wherein current flowing between the electrodes is sensitive to environmental conditions within the channel.

34. A sensor according to claim 33 wherein the environmental conditions are temperature.

35. A sensor according to claim 34 wherein the environmental conditions are the presence of a species to be sensed.

36. A sensor as claimed in any of claims 30 to 35, wherein said electrodes form source and drain electrodes of a field-effect transistor.

37. A sensor as claimed in claim 36 wherein said field-effect transistor is a vertical-channel field-effect transistor.

38. A sensor as claimed in any of claims 1 to 37 further comprising one or more other electronic devices that are integrated onto the first substrate and wherein the other electronic devices are electrically connected to the electronic sensing device.

39. A sensor as claimed in claim 38, wherein at least one of said other electronic devices performs a signal amplification function.

40. A sensor as claimed in claim 38, wherein at least one of said other electronic devices performs a memory function.

41. A sensor as claimed in claim 38, wherein at least one of said other electronic devices performs a calibration function.

42. A method for producing a sensor, the method comprising the steps of: forming a body comprising an electrically conductive layer; and embossing the body to define a microfluidic channel and a pair of electrodes, the pair of electrodes being exposed at the surface of the channel.

43. A method as claimed in claim 42 wherein the step of defining said pair of electrodes comprises microcutting the electrically conductive layer.

44. A method as claimed in claim 42 or claim 43 further comprising the step of depositing over the body a layer of a semiconductive material.

45. A method as claimed in claim 44 further comprising the step of depositing over the layer of semiconductive material a layer of an insulating material.

46. A method as claimed in claim 45 further comprising the step of depositing over the layer of insulating material a layer of a conductive material.

47. A sensor comprising a microfluidic channel and an electronic sensing device, wherein an insulating part of the electronic sensing device is exposed at the surface of the microfluidic channel.